Superior Refinery Fire ER

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WI DNR – JOHN SAGER, JASON LOWERY

Photo:
Courtesy of
Bob King,
Duluth News Tribune

NRC Report, Superior Refinery Explosion Superior, Wisconsin

- Report came in ~10:30 am on Thursday 4/26
- Initial report for air release of an "unknown hydrocarbon that was released to the air after an explosion during the shutdown of equipment"

Timeline

- 1000 CST: initial explosion occurred; shrapnel damaged tank 101 asphalt (50,400 barrels)
- 1100 CST: small initial fire extinguished
- 1200 CST: second fire began in breached tank 101
  - Refinery evacuated
  - Fire later spread to process units, ground fires, a vac tower, a crude unit, multiple tanks
- 1300 CST: community evacuation ordered
  - Concern over HF tank
- 1842 CST: bulk of fire extinguished
- 2355 CST: hot spots extinguished
- Community evacuation lifted next morning at 6 am

Photo from Wisconsin Public Radio

Photo from KSTP

Chemical Safety Board Review

- https://www.youtube.com/watch?v=OU0dIK5EJYI

- To date the CSB has determined the following:
- The explosion took place during a planned maintenance shutdown of the refinery FCCU.
- The incident occurred during a scheduled break time and many workers previously in the unit before the explosion had moved either into blast resistant buildings or away from the process unit.
- One piece of debris from the explosion flew about 200 feet, and struck a large, nearby, aboveground storage tank containing about 50,000 barrels of asphalt. The side of the tank was punctured, resulting in the release of over 15,000 barrels of hot asphalt into the refinery.
- Approximately two hours after the release, the asphalt ignited, resulting in a large fire.
- As a result of the explosion, thirty-six people sought medical attention, including eleven refinery and contract workers who sustained OSHA recordable injuries. In addition, a large portion of Superior, Wisconsin was evacuated.

Initial Actions

- EPA Morrison mobilized to scene.
- Request IMAAC Model Run
  - Initial and revised model
- Ensure Notifications
  - Tribal, state, trustees
- Contact ATSDR, going to need assistance.
- Coast Guard
  - MSU Duluth mobilized
- Additional OSCs mobilized (Miller, Mitchell, Hassan)
- First day: EPA deployed 4 OSCs, 1 ERT member,

  2 SERAS personnel, and 7 START to the incident.

- Early in the response, EPA requested air plume modeling analysis support from the Inter-Agency Modeling and Atmospheric Assessment Center (IMAAC).
  - The first model run was do determine plume and likely soot deposition.
  - The second run was to include the hazardous substances.

- The OSCs also received the EPCRA Tier II report of chemicals at the facility . The Tier II information was used to identify the EHS chemicals such as ammonia, Hydrofluoric Acid (HF) and chlorine that were on site.

- The FRP was also sent for oil spill response information.


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IMAAC

Interagency Modeling and Atmospheric Assessment Center

Real World

Husky Refinery Explosion in Superior, Wisconsin

26APR2018 1830Z

RFI – 18 – 0676U Initial Response

26APR2018

Requestor: EPA Region V

Distribution authorized to U.S. Government agencies and their contractors for administrative/operational use.
Date: 04/26/2018
Other requests for this document shall be referred to:
Defense Threat Reduction Agency
8725 John J. Kingman Rd, MS 6201
Fort Belvoir, VA 22060-6201

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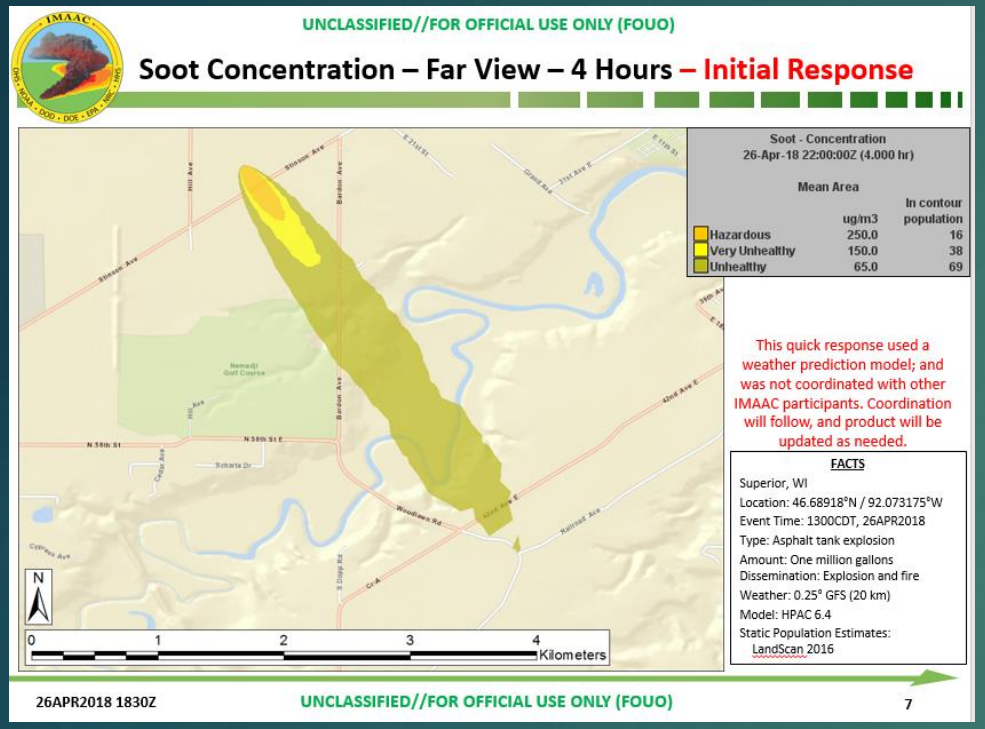
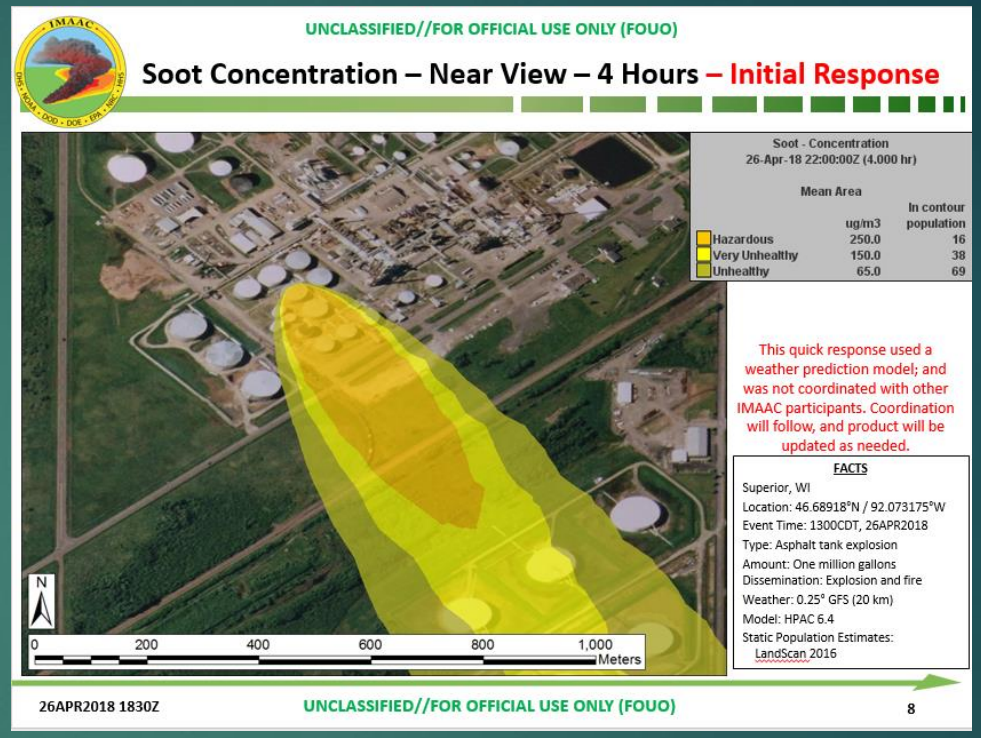
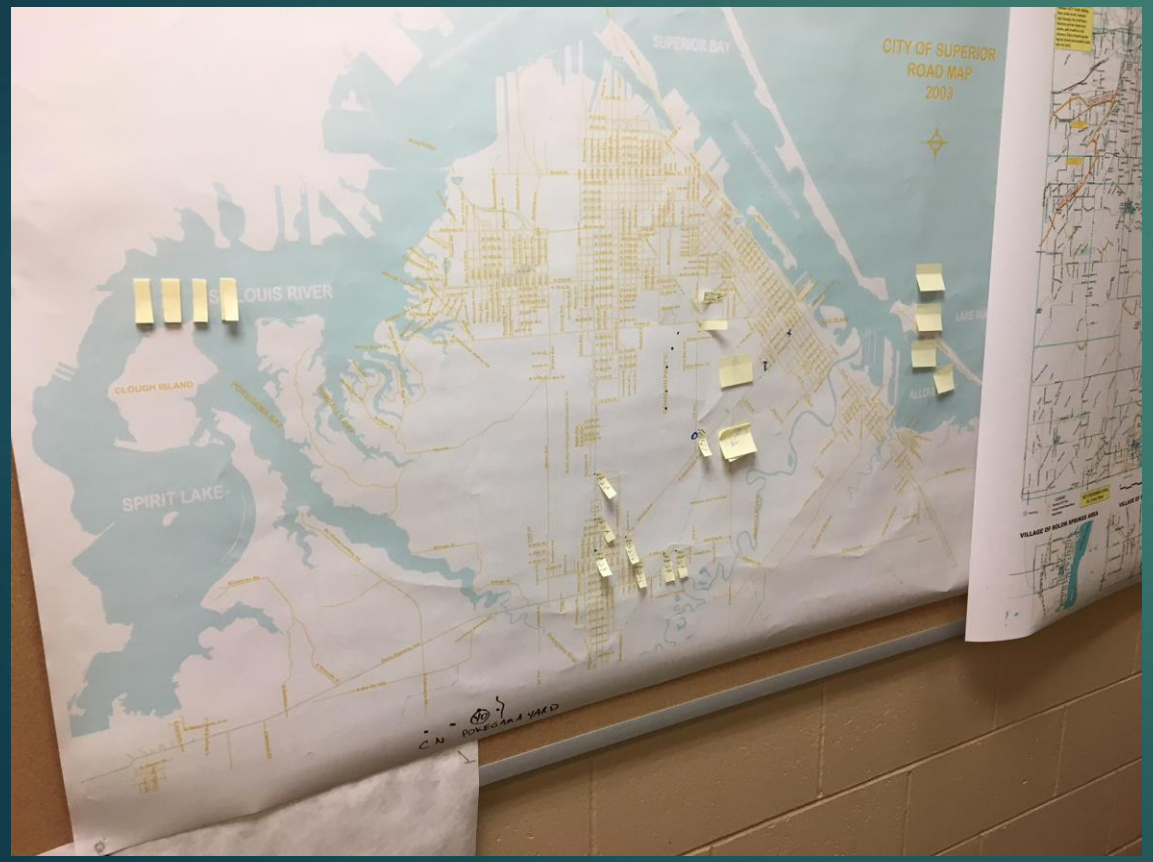
IMAAC Initial Soot Model





First things First. Responder safety

- EPA worked with the Refinery and their consultant GHD to establish a three-tiered air monitoring network and was involved with the review/development of the air monitoring plan. Air monitors were immediately deployed throughout the community to assess risks to first responders (Police enforcing evacuations and closures), at the facility fence line to assess on-going emissions from the damaged facility, and inside the refinery to protect workers from new releases and dangerously unstable situations immediately following the fire.



First air monitoring data map,
Where are the police deployed ?

- EPA worked overnight to collect air data in support of lifting the evacuation order on the 27th.

Local HM team involved in fire, did not develop air monitoring .

Refinery HM teams air monitors deployed after explosion, inaccessible after second fire.

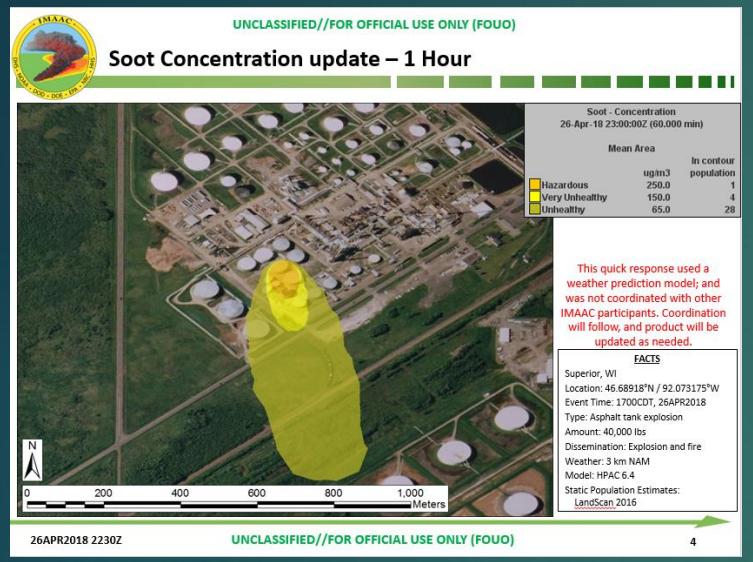
Air monitoring in Hot Zone

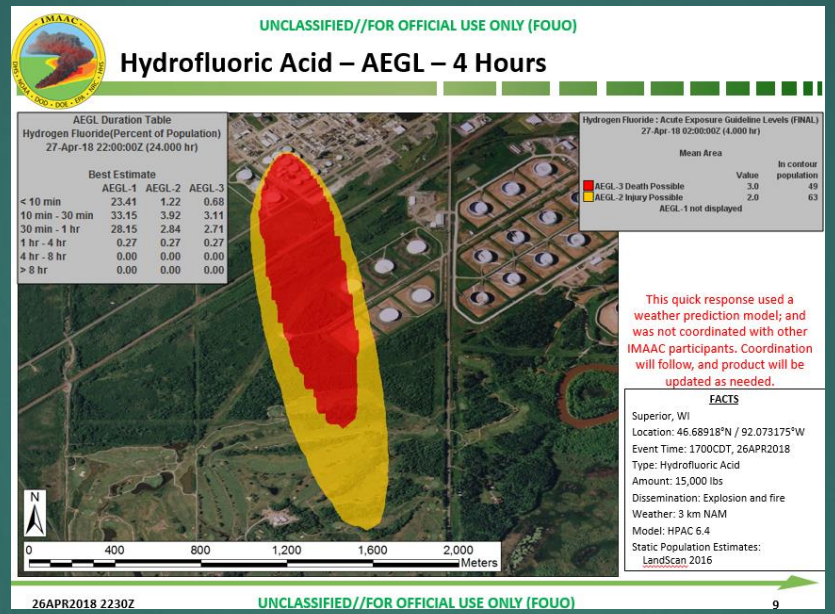
Air monitoring at Fenceline

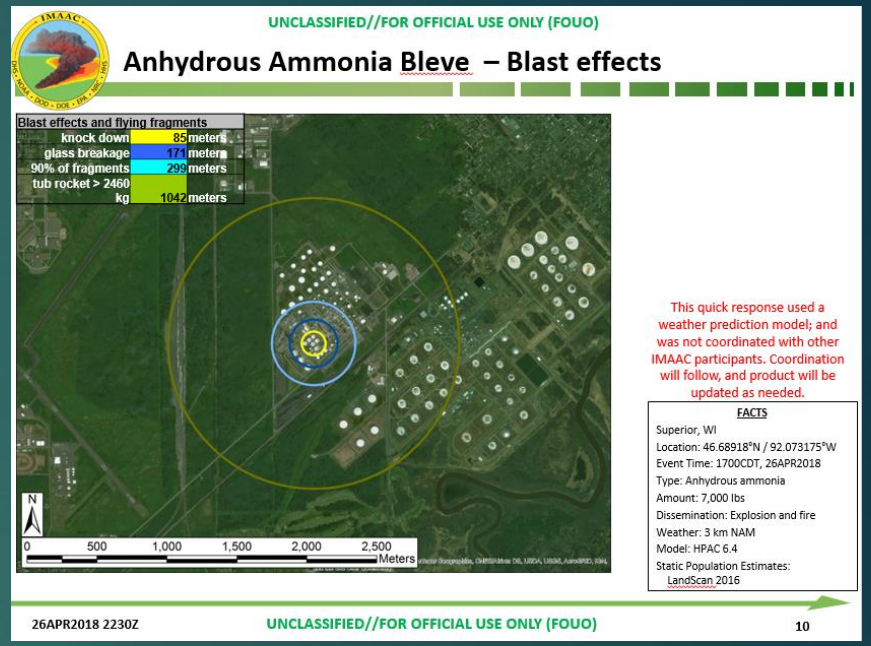
Air monitoring in Community

IMAAC model update 01

Inter-Agency Modeling and Atmospheric Assessment Center







Water Impacts

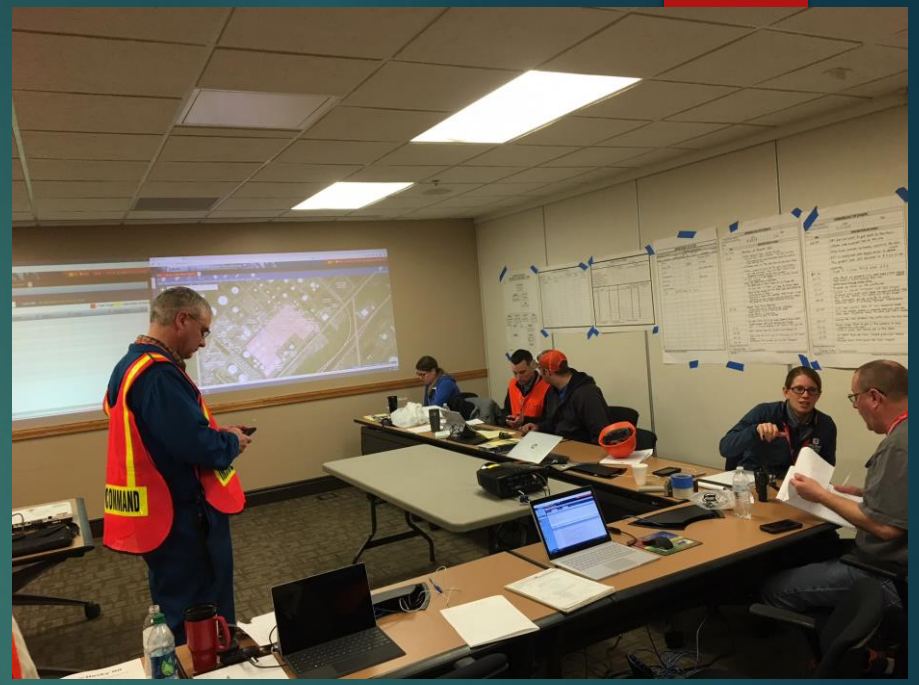
- Oil and firefighting foam in Newton Creek
  - Leads to Lake Superior
- MSU Duluth assisted with initial booming oversight in creek, check on Bay
- Sheen noted in Creek
- WDNR taking the lead on all water issues
  - Water sampling
  - Cleanup of oil and firefighting foam
  - Treatment

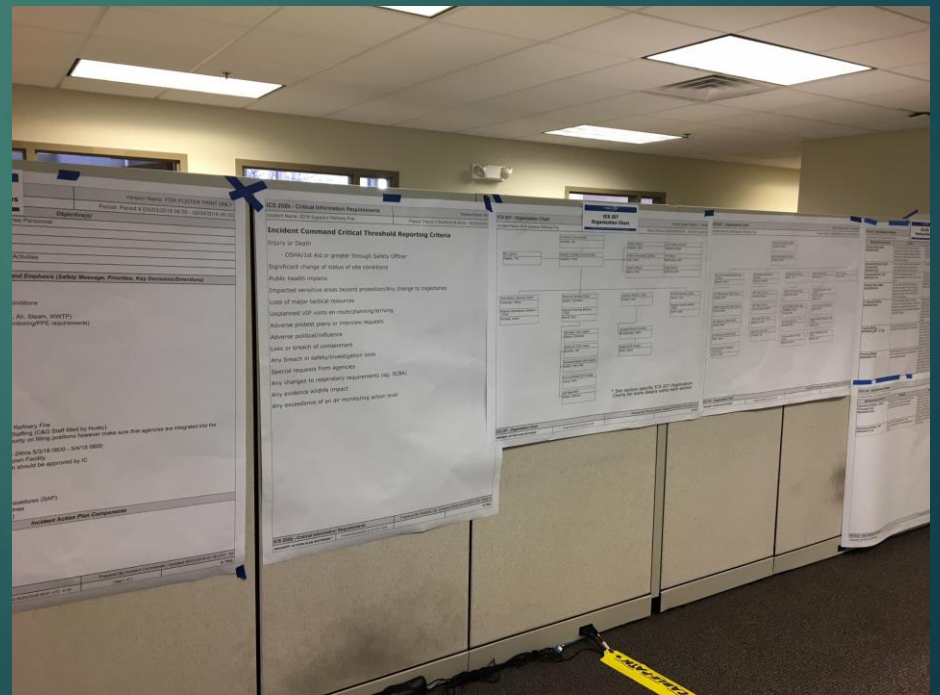
The control structure near the refinery was closed after explosion, but some portion of 21 million gallons of oily-foamy fire fighting water made its way to the bay.

Mouth of Newton Creek

In addition to 17,000 barrels of asphalt oil from tank 101, No. 6 fuel oil was released from a tank along with every kind of leaking liquid from perforated/broken piping at the refinery.

Incident Command Post, moved four times.





More on Air Monitoring

- EPA worked with Refinery's Consultant GHD to develop an air monitoring plan.
- EPA developed a Web viewer to manage and share data and information and established the capability for a data push to EPA VIPER servers in case of another incident so stakeholders had immediate access to the data.
- At the end of each day, all air monitoring data was summarized and provided to the Wisconsin State Health Department and the Douglas County Department of Health and made available to the public through their web-site.
- EPA later collected independent air samples for chemicals of concern.